

MaineDOT's Porous Pavement

Maine Mall Road - 9 Years Later

Derek Nener-Plante, M.S., P.E.

Asphalt Pavement Engineer,
MaineDOT



Wednesday, October 17th 2018



What is Permeable/Porous Pavement?

Allow water to drain **through** the pavement structure into a stone bed and infiltrate into the soils below

Why?

Provide storm-water management systems that promote infiltration, improve water quality, and may eliminate need for detention basins or other drainage structures



Project Information

Maine Mall Road in Portland, ME

- Urban location
- Mixed commuter and commercial traffic

Design AADT: 16,750 vehicles/day

Design ESALs: 3,277,700 (20 years)

Design Hourly Volume: 2412 vehicles

Percent Heavy Trucks: 5%



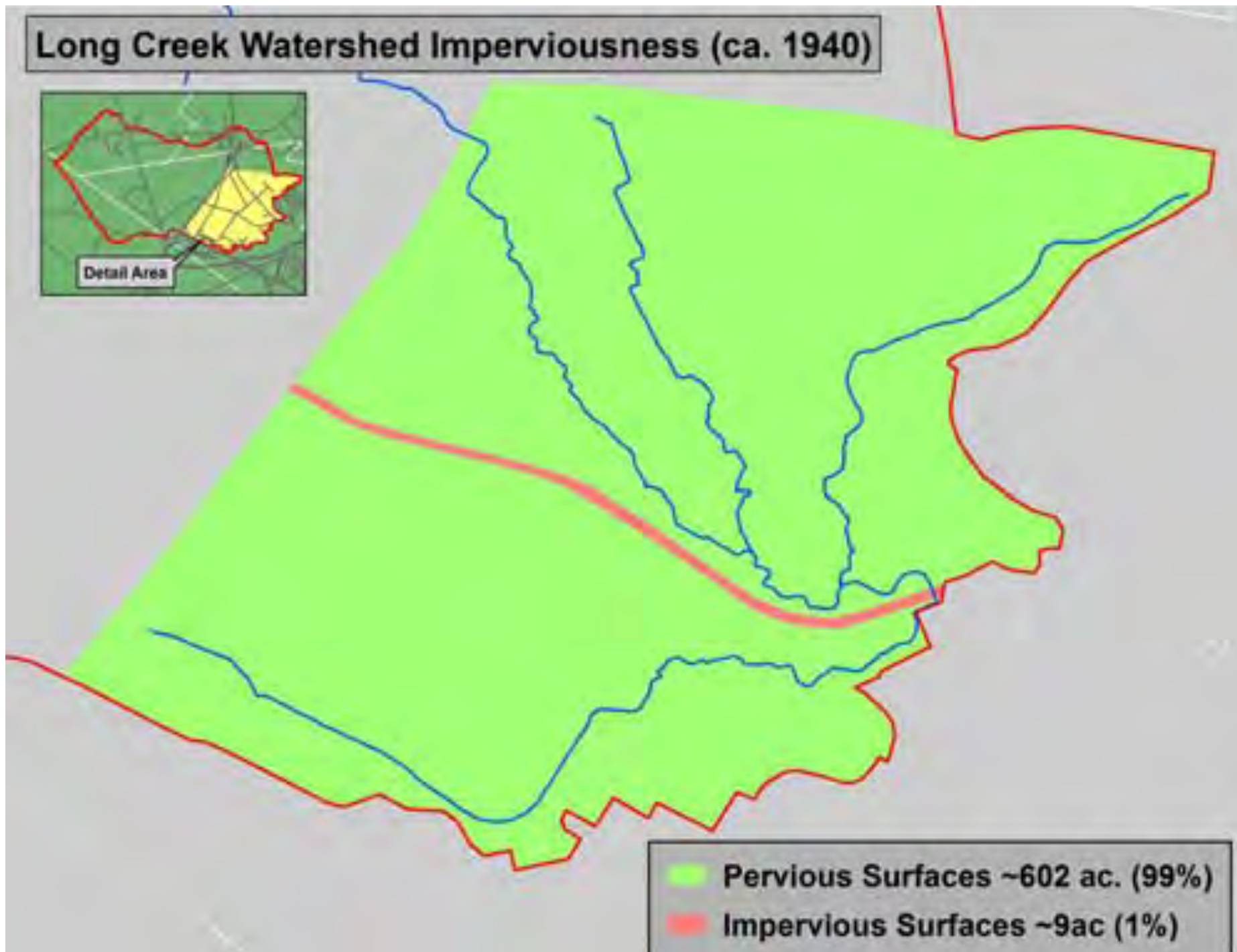


- Total watershed is 2200 acres; 640 acres (28 percent) is impervious
- All landowners with more than 1 acre of impervious surfaces - roofs, parking lots, roads - are regulated

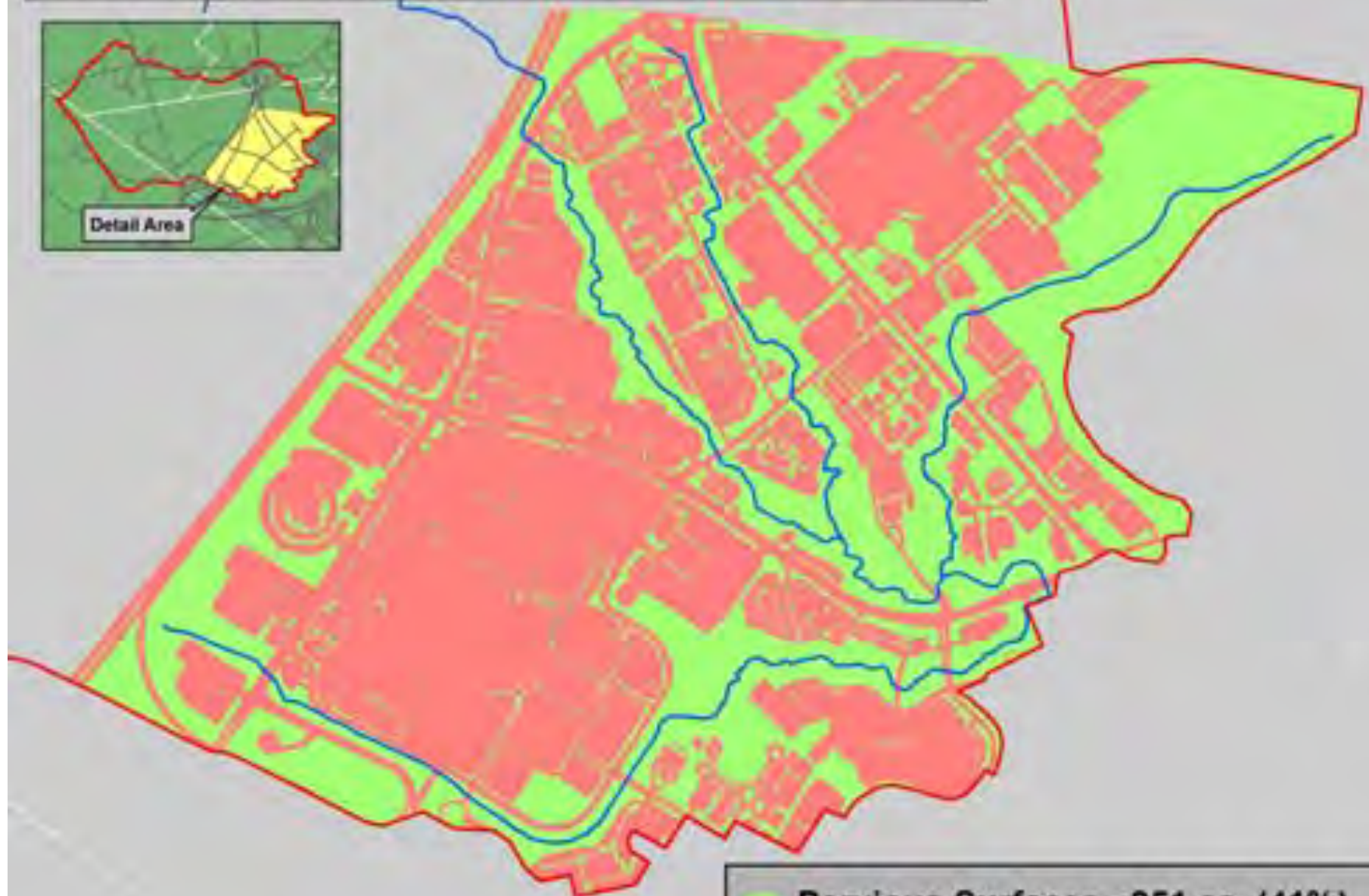
Long Creek Watershed Publicly Owned Roads





Long Creek Watershed Imperviousness (ca. 1940)



Long Creek Watershed Imperviousness (ca. 2004)



-  Pervious Surfaces ~251 ac. (41%)
-  Impervious Surfaces ~360 ac. (59%)

Deciding Factors for Project

Permit Options

Individual Permit

- Apply water quality practices on all 64 acres regardless of impact on stream

General Permit

- Participate in Long Creek Watershed Management Plan with other landowners and collectively treat priority areas

- American Recovery and Reinvestment Act
 - 100 % Federal cost-sharing
- Satisfies part of MaineDOT Regulatory Requirements
- Opportunity to apply porous pavement to an urban highway

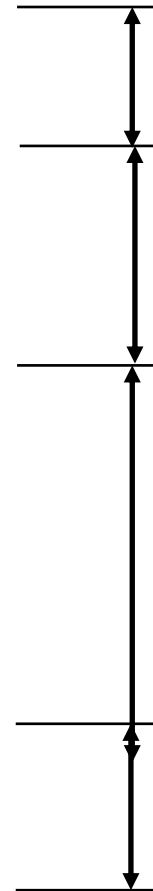
Pavement Section

OGFC

ATPB

Reservoir
Stone

Filter
Material



3"

6"

15"

6 – 12"



Filter Layer

- Filters pollutants
- Help mitigate water temperature
- Includes 3 longitudinal runs of 6" perforated UD pipe, with laterals every 120'
- Filter material meets gradation for MaineDOT Type B underdrain sand





Reservoir Stone Layer

AGGREGATE REQUIREMENTS	
2-1/2"	100
2"	95 – 100
1"	0 - 30
3/4"	0 – 5.0
L.A. Abrasion	25.0 max.







Asphalt Treated Permeable Base

- Binder : PG 76–28 with SBS polymer
- Minimum 2% binder
- 95 percent coated particles (AASHTO T 195)
- 35 gyration design: looking for specimen that will be stable



Asphalt Treated Permeable Base

AGGREGATE QUALITIES	
Micro-Deval	18.0 maximum
% Fractured	85/80
Flat/Elongated	10

JOB MIX FORMULA		
SIEVE SIZE	TARGET	SPEC RANGE
37.5 mm	100	100
25 mm	96	95 – 100
19 mm	90	80 – 95
12.5 mm	48	35 – 70
4.75 mm	6	2 – 10
2.36 mm	3	0 – 5
0.075 mm	1.3	0 – 2.0
Binder content	2.0	2.0 minimum



ATPB Placement

- ATPB placed at 7.5" and compacted to 6" finished depth
- Placement/production temperatures: 290 – 340°F
- Breakdown rolling temperature at approx. 200 – 210°F
- Mixture needed to "stiffen" enough to support compaction equipment



Open Graded Friction Course

- Binder : PG 76–28 with SBS polymer
- Minimum 6.0% binder
- 20.0% Voids @ N_{des}
- 50 gyration design
- 0.3% Cellulose Fibers



Open Graded Friction Course

AGGREGATE QUALITIES	
Micro-Deval	18.0 maximum
% Fractured	100/90
Flat/Elongated	5 max.
Sand Eq.	50
FAA	45

JOB MIX FORMULA		
SIEVE SIZE	TARGET	SPEC RANGE
19 mm	100	100
12.5 mm	96	85 - 100
9.5 mm	65	55 - 75
4.75 mm	20	10 - 25
2.36 mm	8	5 - 10
0.075 mm	2.3	2.0 – 4.0
Binder content	6.0	6.0% minimum



OGFC Placement

- Similar placement temperatures as ATPB
- 12 ton static roller was used as breakdown (approx. 180- 210 deg. F)
- 3-5 ton used as intermediate (approx 140 deg. F)
- 10 ton static finish roller, with 3-5 and 1 ton rollers to iron out any marks left behind







How does it look
today?



Southbound Direction





















Northbound Direction















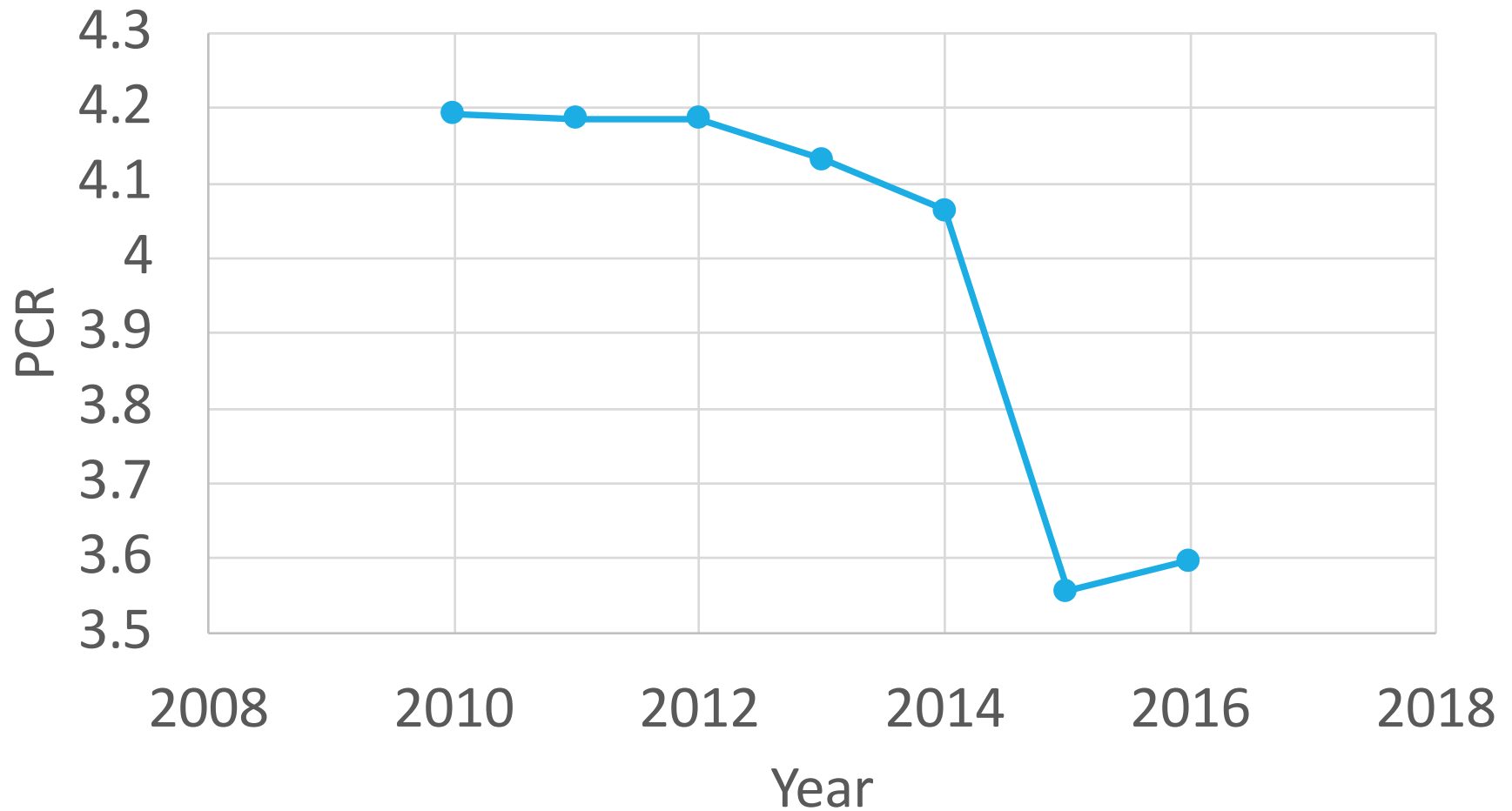




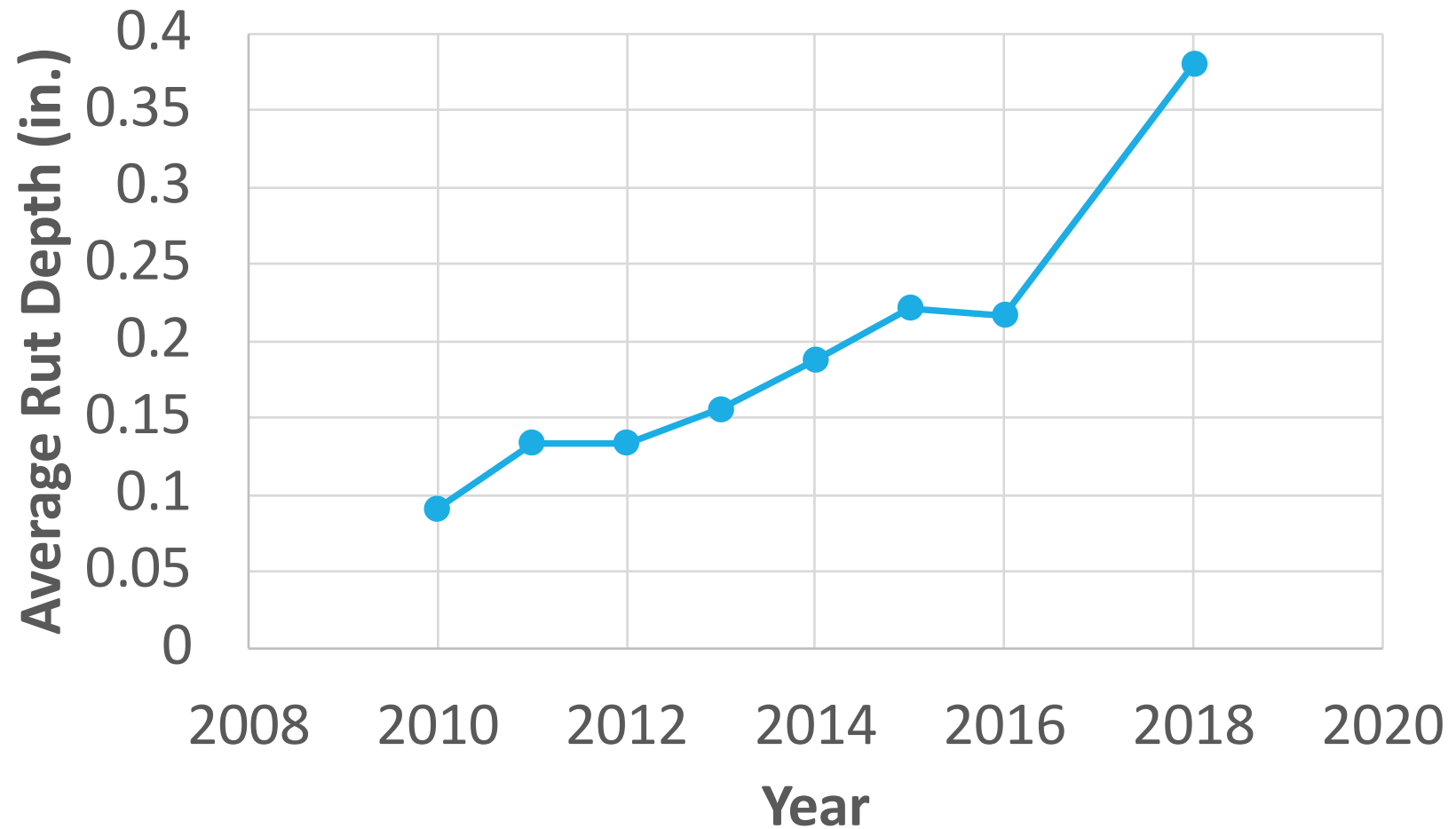




Pavement Condition Rating



Average Rutting





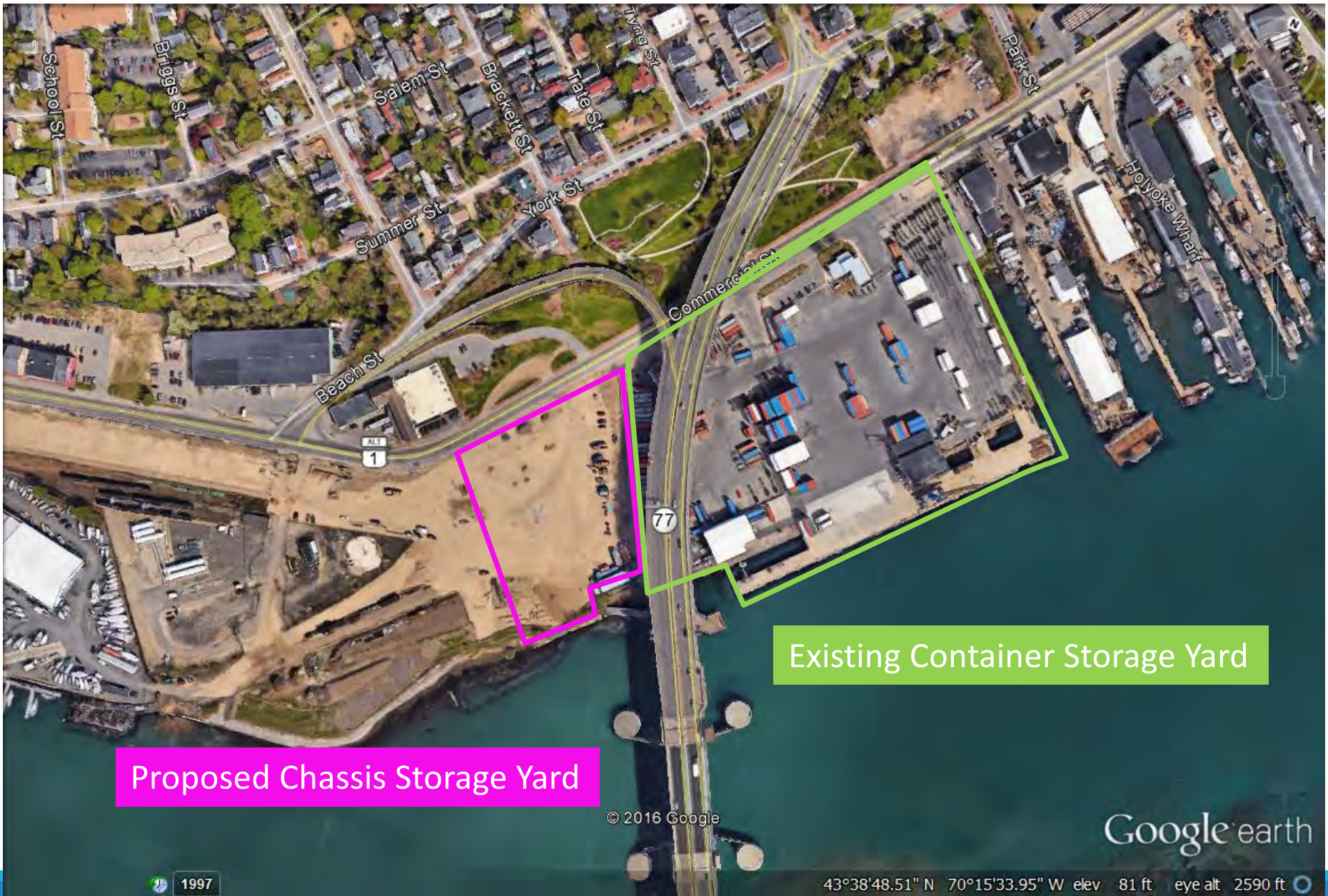
Observations

- Project holding up well after nine years of service
- Localized raveling – primarily at construction joints
- Patching around the mall entrance – most likely due to tracking sand onto porous section
- **MaineDOT very satisfied with the performance thus far**

International Marine Terminal Chassis Yard Paving Project



International Marine Terminal Chassis Yard Paving



Existing Container Storage Yard

Proposed Chassis Storage Yard

© 2016 Google

Google earth

1997

43°38'48.51" N 70°15'33.95" W elev 81 ft eye alt 2590 ft

International Marine Terminal Chassis Yard Paving

**Team tasked with developing
a few options for a pavement with these requirements:**

- **meets stormwater/infiltration requirements**
 - **supports Port Authority yard vehicles**
 - **durable**
 - **constructible**
 - **cost effective**
 - **flexible in vehicle and storage use**

**International Marine Terminal
Chassis Yard Paving Project**

#1 Requirement

**To provide a pavement structure that would
allow stormwater to infiltrate and filter
roadway pollutants before entering into the
Casco Bay**

**International Marine Terminal
Chassis Yard Paving Project**

**ESAL's calculated for both vehicle types were
combined for final design**

Unloaded MI-JACK ESAL's



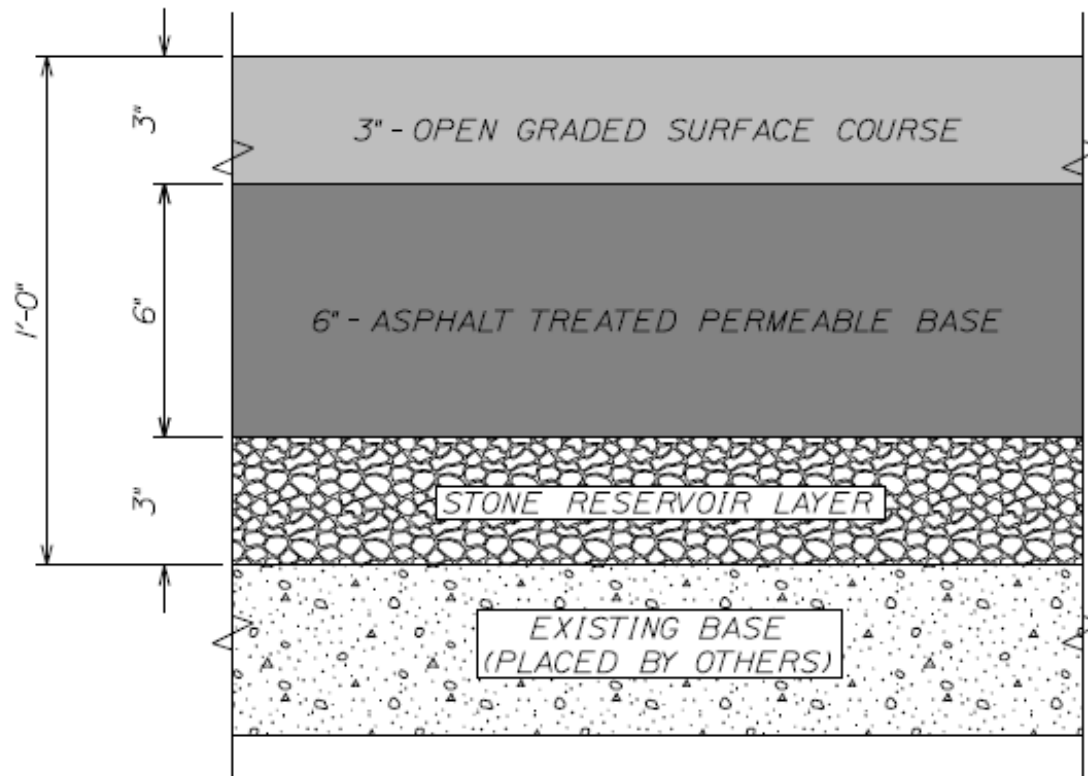
TRACTOR TRAILER ESAL's



International Marine Terminal
Chassis Yard Paving Project

Final Pavement Design

(DARWin 3.1 Software used to calculate final Porous Pavement design)



TYPICAL POROUS PAVEMENT SECTION

International Marine Terminal Chassis Yard Paving Project

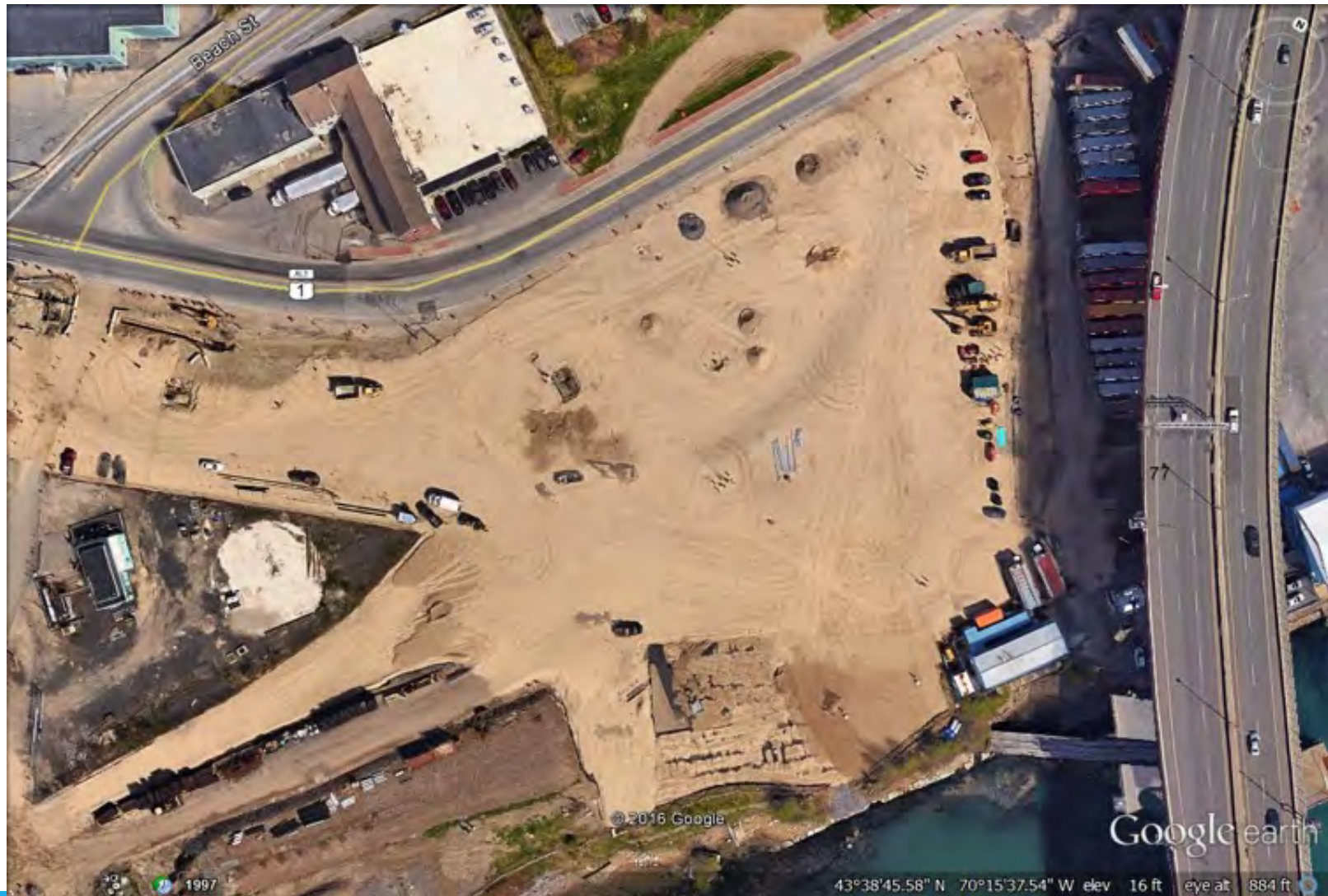
Pavement Construction



International Marine Terminal Chassis Yard Paving Project

Phase 1

Drainage, subbase and lighting foundation installation













Questions?

